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On the Computation of the Effect of the Attraction of Mountain Masses as disturbing the Apparent Astronomical Latitude of Stations in Geodetic Surveys. By G. B. Airy, Esq., Astronomer Royal.*

In this short paper the author considered the conclusion to which Archdeacon Pratt was conducted by his investigation of the effects of mountain attraction on the direction of the plumb-line in India. He remarks that not only is there nothing surprising in the discordance between the observed and computed deflections, but that it ought to have been anticipated, and that, instead of expecting a positive effect of attraction of a large mountain mass upon a station at a considerable distance from it, we ought to be prepared to expect no effect whatever, or in some cases even a small negative effect.

For the purpose of illustrating his views the author supposes the crust of the earth to be ten miles thick, and to be of less density than the fluid in the interior, which for convenience of designation he calls *lava*. Supposing a mass of table-land to rest upon the earth's surface, the breadth of which mass in its smaller horizontal dimension is 100 miles, and the height two miles, the author maintains that the permanent existence of such a state of things is not possible in nature, for the weight of the table-land would break the crust through its whole depth from the top of the table-land to the surface of the lava, and either the whole or only the middle part would sink into the lava. He proceeds to prove this by showing that the cohesion which would be necessary to prevent the table-land from breaking the crust would be capable of supporting a hanging column of rock twenty miles long, a conclusion which is contrary to all experience. Other suppositions with respect to the thickness of the crust are shown to lead to conclusions equally inadmissible.

The author is of opinion that there can be no other support to the table-land than that arising from the downward projection of a portion of the earth's light crust into the dense lava. He conceives, in fact, that the state of the earth's crust lying upon the lava may be compared with perfect correctness to the state of a raft of timber floating upon water, in which, if we remark one log whose upper surface floats much higher than the upper surfaces of the others, we are certain that its lower surface lies deeper in the water than the lower surfaces of the others. According to this view of the subject the disturbing influence will depend on the positive attraction produced by the elevated table-land and the negative attraction produced by the substitution of a certain volume of light crust for heavy lava.

The general conclusion at which the author arrives is this: in all cases the real disturbance will be less than that found by com-

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* Phil. Trans., 1855, p. 101, *et seq.*

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puting the effect of the mountains, on the law of gravitation. Near to the elevated country the part which is to be subtracted from the computed effect is a small proportion of the whole. At a distance from the elevated country the part which is to be subtracted is so nearly equal to the whole that the remainder may be neglected as insignificant, even in cases where the attraction of the elevated country itself would be considerable. But in our ignorance of the depth at which the downward immersion of the projecting crust into the lava takes place, we cannot give greater precision to the statement.

The author finally remarks that the condition of *breakage* of the table-lands which pervades his reasoning is not applicable to such elevations as Schehallien, but to high tracts of very great horizontal extent, such as those to the north of India.

Measurements of Saturn made with the Astronomer Royal's Double-Image Micrometer employed with a Thirteen-inch Newtonian Equatoreal. By Warren De la Rue, Esq.

			Reduced to M.D. 9·5430
Outer diameter of Outer Ring,	Oct. 30, 1854	45″·913	39″·63
,, ,,	Dec. 3,	47·226	39·83
,, ,,	10,	47·811	40·35
,, ,,	Dec. 23, 1855	46·970	39·53
		Mean	39·83
Inner diameter of Outer Ring,	Oct. 30, 1854	41″·345	35″·69
,, ,,	Dec. 3,	41·629	35·11
,, ,,	10,	11·700	35·20
		Mean	35·33
Outer diameter of Middle Ring,	Dec. 3, 1854	39″·352	33″·19
,, ,,	10,	39·950	33·72
		Mean	33·45
Inner diameter of Middle Ring,	Dec. 3, 1854	31″·03	26″·17
,, ,,	18, 1855	32·87	27·65
		Mean	26·91
Equatoreal diameter of Planet,	Dec. 3, 1854	20″·967	17″·66

Each of the measures given is the mean of at least six readings of the micrometer, the contacts being made alternately on opposite sides. One revolution of the micrometer being equal to 8″·018, except with the lens employed on Dec. 10, 1854, when one revolution was equal to 4″·4001.

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